WHAT IS CLAIMED IS:

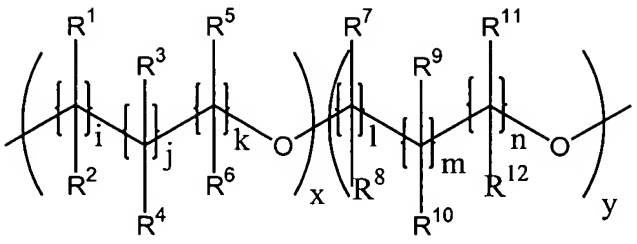
1. A method of synthesizing a CO_2-philic analog of a CO_2-phobic compound that is more CO_2-philic than the CO_2-phobic compound, comprising the step of:

reacting the CO_2-phobic compound with a CO_2-philic compound, wherein the CO_2-philic compound is a polyether substituted with at least one side group including a Lewis base, a poly(ether-carbonate), a poly(ether-carbonate) substituted with at least one side group including a Lewis base, a vinyl polymer substituted with at least one side groups including a Lewis base, a poly(ether-ester) or a poly(ether-ester) substituted with at least one side groups including a Lewis base to create the CO_2-philic analog.

2. The method of claim 1 wherein the CO_2-philic compound is a polyether substituted with at least one side group including a Lewis base, a poly(ether-carbonate), a poly(ether-carbonate) substituted with at least one side group including a Lewis base, or a vinyl polymer substituted with at least one side group including a Lewis base.

3. The method of claim 1 wherein the CO_2-philic contains no F or Si atoms.

4. The method of claim 1 wherein the CO_2-philic compound is a polyether copolymer including the repeat units



wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, and R^{12} are, independently, the same or different, H, an alkyl group, $-(R^{22'})_zR^{22}$, or R^4 and R^6 form of carbon cyclic chain of 3 to 8 carbon atoms, wherein $R^{22'}$ is an alkylene group and z is 0 or 1, and R^{22} is a Lewis base group, wherein at least one of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, and R^{12} is $-(R^{22'})_zR^{22}$, wherein, i, j, k, l, m, and n are independently, the same or different, 0, 1 or 2, at least one of i, j, and k being 1 or 2 and at least one of l, m, and being 1 or 2, and x and y are integers.

5. The method of claim 4 wherein R^{22} is $-O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

6. The method of claim 4 wherein $R^{22'}$ is $-(CH_2)_a-$ and a is an integer between 0 and 5.

7. The method of claim 6 wherein a is 1 or 2 and i is 0, j is 1, k is 1, l is 0, m is 1 and n is 1

8. The method of claim 7 wherein R^3, R^4, R^5, R^9, R^{10}, and R^{11} are H, R^6 is an alkyl group and R^{12} is $-(CH_2)_a-R^{22}$.

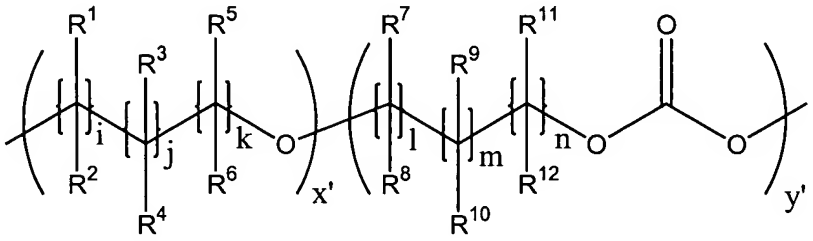
9. The method of claim 8 wherein R^{22} is $O\text{-}C(O)\text{-}R^{23}$, $-C(O)\text{-}R^{23}$, $-O\text{-}P(O)\text{-}(O\text{-}R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

10. The method of claim 8 wherein R^{22} is $-O\text{-}C(O)\text{-}R^{23}$.

11. The method of claim 10 wherein R^{23} is a methyl group.

12. The method of claim 4 wherein the polyether copolymer contains no F or Si atoms.

13. The method of claim 1 wherein the CO_2-philic compound is a poly(ether-carbonate) copolymer including the repeat units:



wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, and R^{12} are, independently, the same or different, H, an alkyl group, $-(R^{22'})_zR^{22}$, or R^4 and R^6 form of carbon cyclic chain of 3 to 8 carbon atoms, wherein $R^{22'}$ is an alkylene group and z is 0 or 1, and R^{22} is a Lewis base group, wherein, i, j, k, l, m, and n are independently, the same or different, 0, 1 or 2, at least one of i, j, and k being 1 or 2 and at

least one of l, m, and being 1 or 2, and x' and y' are integers.

14. The method of claim 13 wherein R^{22} is $-O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

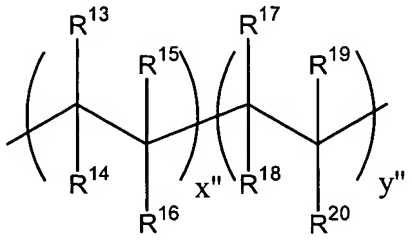
15. The method of claim 14 wherein $R^{22'}$ is $-(CH_2)_a-$ and a is an integer between 0 and 5.

16. The method of claim 15 wherein a is 1 or 2.

17. The method of claim 13 wherein i is 0, j is 1, k is 1, l is 0, m is 1 and n is 1 and R^3, R^4, R^5, R^9, R^{10}, and R^{11} are H, R^6 is an alkyl group and R^{12} is an alkyl group.

18. The method of claim 13 wherein the poly(ether-carbonate) copolymer contains no F or Si atoms.

19. The method of claim 1 wherein the vinyl polymer is a copolymer including the repeat units:



wherein R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, and R^{20} are, independently, the same or different, H, an alkyl group, an alkenyl group, $-O-R^{24}$, $-(R^{22'})_zR^{22}$, wherein, $R^{22'}$ is an alkylene group, R^{22} is a Lewis base group and z is 0 or 1, R^{24} is an alkyl group, wherein at least one of R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, and R^{20} is $-(R^{22'})_zR^{22}$, and x″ and y″ are integers.

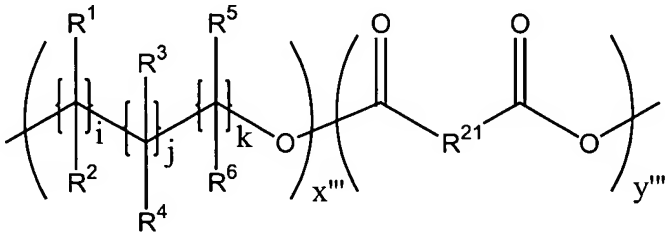
20. The method of claim 19 wherein $R^{22'}$ is $-(CH_2)_a-$ and a is an integer between 0 and 5.

21. The method of claim 20 wherein a is 1 or 2 and R^{22} is $-O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

22. The method of claim 21 wherein R^{22} is $-O-C(O)-R^{23}$.

23. The method of claim 19 wherein the vinyl copolymer contains no F or Si atoms.

24. The method of claim 1 wherein the CO_2-philic compound is a poly(ether-ester) copolymer including the repeat units



wherein R^1, R^2, R^3, R^4, R^5 and R^6 are, independently, the same or different, H, an alkyl group, $-(R^{22'})_zR^{22}$, or R^4 and R^6 form of carbon cyclic chain of 3 to 8 carbon atoms, wherein z is 0 or 1, $R^{22'}$ is an alkylene group and R^{22} is a lewis base group, wherein, i, j and k are independently, the same or different, 0, 1 or 2, at least one of i, j, and k being 1 or 2, R^{21} is an alkylene group, a cycloalkylene group, a difunctional ester group, or a difunctional ether group, and x''' and y''' are integers.

25. The method of claim 24 wherein at least one of R^1, R^2, R^3, R^4, R^5 and R^6 is $-(R^{22'})_zR^{22}$, and R^{22} is $-O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

26. The method of claim 25 wherein $R^{22'}$ is $-(CH_2)_a-$ and a is an integer between 0 and 5.

27. The method of claim 26 wherein a is 1 or 2 and i is 0, j is 1, and k is 1.

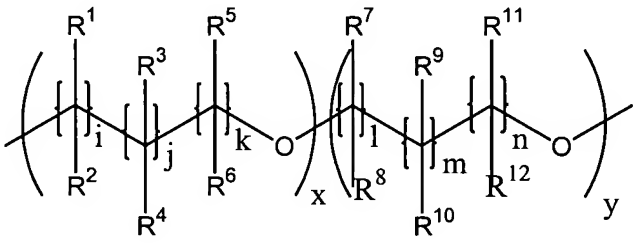
28. The method of claim 24 wherein R^{22} is $-O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

29. The method of claim 27 wherein R^{22} is $-O-C(O)-R^{23}$.

30. A surfactant for use in carbon dioxide, the surfactant comprising a CO_2-phobic group covalently linked

to a CO_2-philic segment, wherein the CO_2-philic segment includes a polyether substituted with at least one side group including a Lewis base, a poly(ether-carbonate), a poly(ether-carbonate) substituted with at least one side group including a Lewis base, a vinyl polymer substituted with at least one side group including a Lewis base, a poly(ether-ester) or a poly(ether-ester) substituted with at least one side group including a Lewis base.

31. The surfactant of claim 30 wherein the polyether is a polyether copolymer including the repeat units



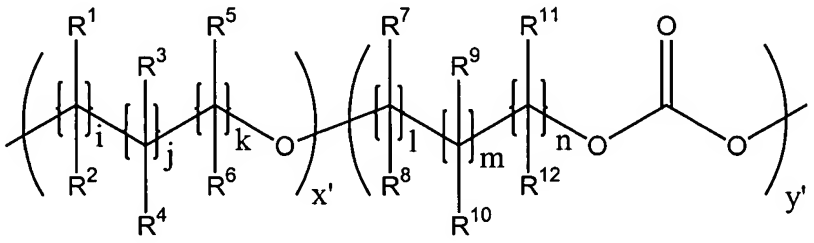
wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, and R^{12} are, independently, the same or different, H, an alkyl group, $-(R^{22'})_zR^{22}$, or R^4 and R^6 form of carbon cyclic chain of 3 to 8 carbon atoms, wherein $R^{22'}$ is an alkylene group and z is 0 or 1, and R^{22} is a Lewis base group, wherein at least one of R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, and R^{12} is $-(R^{22'})_zR^{22}$, wherein, i, j, k, l, m, and n are independently, the same or different, 0, 1 or 2, at least one of i, j, and k being 1 or 2 and at least one of l, m, and being 1 or 2, and x and y are integers.

32. The surfactant of claim 31 wherein R^{22} is $-O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein

R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

33. The surfactant of claim 32 wherein $R^{22'}$ is $-(CH_2)_a-$ and a is an integer between 0 and 5.

34. The surfactant of claim 30 wherein the poly(ether-carbonate) copolymer includes the repeat units:

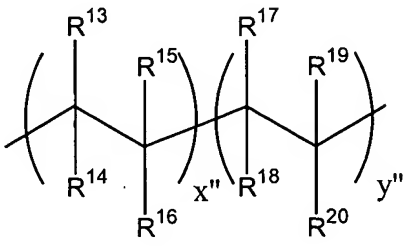


wherein R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, and R^{12} are, independently, the same or different, H, an alkyl group, $-(R^{22'})_zR^{22}$, or R^4 and R^6 form of carbon cyclic chain of 3 to 8 carbon atoms, wherein $R^{22'}$ is an alkylene group and z is 0 or 1, and R^{22} is a Lewis base group, wherein, i, j, k, l, m, and n are independently, the same or different, 0, 1 or 2, at least one of i, j, and k being 1 or 2 and at least one of l, m, and being 1 or 2, and x' and y' are integers.

35. The surfactant of claim 34 wherein R^{22} is $-O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

36. The surfactant of claim 36 wherein $R^{22'}$ is $-(CH_2)_a-$ and a is an integer between 0 and 5.

37. The surfactant of claim 30 wherein the vinyl polymer is a copolymer including the repeat units:



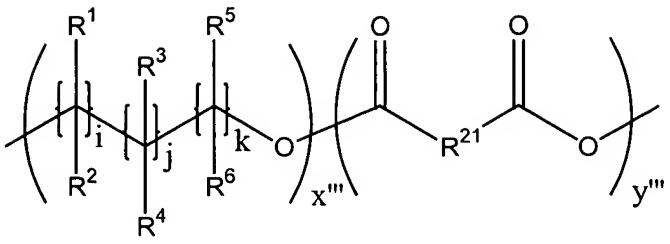
wherein R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, and R^{20} are, independently, the same or different, H, an alkyl group, an alkenyl group, $-O-R^{24}$, $-(R^{22'})_zR^{22}$, wherein, $R^{22'}$ is an alkylene group, R^{22} is a Lewis base group and z is 0 or 1, R^{24} is an alkyl group, wherein at least one of R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, and R^{20} is $-(R^{22'})_zR^{22}$, and x" and y" are integers.

38. The surfactant of claim 37 wherein $R^{22'}$ is $-(CH_2)_a-$ and a is an integer between 0 and 5.

39. The surfactant of claim 38 wherein a is 1 or 2 and R^{22} is $-O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

40. The surfactant of claim 39 wherein R^{22} is $-O-C(O)-R^{23}$.

41. The surfactant of claim 30 wherein the CO_2-philic compound is a poly(ether-ester) copolymer including the repeat units



wherein R^1, R^2, R^3, R^4, R^5 and R^6 are, independently, the same or different, H, an alkyl group, $-(R^{22'})_zR^{22}$, or R^4 and R^6 form of carbon cyclic chain of 3 to 8 carbon atoms, wherein z is 0 or 1, $R^{22'}$ is an alkylene group and R^{22} is a lewis base group, wherein, i, j and k are independently, the same or different, 0, 1 or 2, at least one of i, j, and k being 1 or 2, R^{21} is an alkylene group, a cycloalkylene group, a difunctional ester group, or a difunctional ether group, and x''' and y''' are integers.

42. The surfactant of claim 41 wherein at least one of R^1, R^2, R^3, R^4, R^5 and R^6 is $-(R^{22'})_zR^{22}$, the lewis base group is $O-C(O)-R^{23}$, $-C(O)-R^{23}$, $-O-P(O)-(O-R^{23})_2$, or $-NR^{23}R^{23'}$, wherein R^{23} and $R^{23'}$ are independently, the same or different, an alkyl group.

43. The surfactant of claim 42 wherein $R^{22'}$ is $-(CH_2)_a-$ and a is an integer between 0 and 5.

44. The surfactant of claim 30 wherein the CO_2-phobic group is H, a carboxylic acid group, a hydroxy group, a phosphato group, a phosphato ester group, a sulfonyl group, a sulfonate group, a sulfate group, a branched or straight chained polyalkylene oxide group, an amine oxide group, an alkenyl group, a nitryl group, a glyceryl group, an ammonium, an alkyl ammonium, an aryl

group unsubstituted or substituted with an alkyl group or an alkenyl group, or a carbohydrate unsubstituted with an alkyl group or an alkenyl group.

45. The surfactant of claim 30 wherein the CO_2-phobic group includes at least one ion selected from the group of H^+, Na^{+2}, Li^+, K^+, NH_4^+, Ca^{+2}, Mg^{+2}, Cl^-, Br^-, I^-, mesylate and tosylate.

46. A chelating agent for use in carbon dioxide, the chelating agent comprising a CO_2-phobic chelating group covalently linked to a CO_2-philic segment, wherein the CO_2-philic segment includes a polyether substituted with side groups including a Lewis base, a poly(ether-carbonate), a poly(ether-carbonate) substituted with side groups including a Lewis base, a vinyl polymer substituted with side groups including a Lewis base, or a poly(ether-ester).

47. The chelating agent of Claim 46 wherein the chelating group is a polyaminocarboxylic acid group, a thoicarbamate group, a dithoicarbamate group, a thiol group, a dithiol group, a picolyl amine group, a bis(picolyl amine) group or a phosphate group.

48. A method of synthesizing a CO_2-philic copolymer comprising the step of copolymerizing at least two monomers, wherein a polymer formed from homopolymerization of one of the monomers has a T_g of less than approximately 250 K and a steric factor less than approximately 1.8, at least one of the monomers results a Lewis base group in the copolymer, and the resultant CO_2-phile does not contain both hydrogen bond donors and acceptors.

49. The method of claim 48 wherein a Lewis base group is within the monomer backbone.

50. The method of claim 48 wherein the Lewis group is a pendant group from the backbone of the at least one monomer.

51. The method of claim 50 wherein the Lewis base group is separated from the CO_2-phile backbone by 0 to 5 atoms.

52. The method of claim 51 wherein the Lewis base group is separated from the CO_2-phile backbone by 1 to 2 atoms.

53. The method of claim 48 wherein the CO_2-phile includes no F or Si atoms.

54. The method of claim 48 wherein the copolymer has less than 400 repeat units.

55. The method of claim 48 wherein the copolymer has less that 200 repeat units.

56. The method of claim 48 wherein the copolymer between 5 and 50 repeat units.

57. The method of claim 48 wherein repeat units of the copolymer including the Lewis base are in the range of 1 to 50 percent of all of the repeat units.

58. The method of claim 48 wherein repeat units of the copolymer including the Lewis base are in the range of 5 to 35 percent of all of the repeat units.

59. The method of claim 48 wherein repeat units of the copolymer including the Lewis base are in the range of 10 to 25 percent of all of the repeat units.

60. The method of claim 48 a first monomer is chosen such that a polymer formed from homopolymerization of the first monomer has a T_g of less than approximately 250 K and a steric factor less than approximately 1.8 and a second and different monomer results a Lewis base group in the copolymer.

61. A method of synthesizing a CO_2-phile comprising the step of copolymerizing carbon dioxide and at least one oxirane.

62. The method of claim 61 wherein the oxirane is ethylene oxide, propylene oxide cyclohexene oxide, or epichlorohydrin.